Tri-Service Safety Conference

Bingen, Germany
15 April 2002

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COMMANDER, NAVAL SAFETY CENTER

Where Are We?

In the last five years (FY97-02), mishaps cost the Navy $4 BILLION and 1,084 LIVES!

175 Sailors and Marines died in FY01

113 Sailors and Marines died this fiscal year*

Indirect costs?

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Cost and Deaths

USN/USMC FY97-02

Cost
In Millions

Aviation
$3.242B

Recreation
$63M

PMV
$134M

Afloat
$384M

Shore/Ground/OpMV
$146M

Total: $4B

Deaths

Traffic
627

Afloat
19

Shore/Ground/OpMV
137

Aviation
157

Recreation
144

Total Deaths: 1,084

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Human Error

USN/USMC FY97-02

| No. of Class-A Mishaps		Human Error	
Navy/Marine Aviation*	140 of 172	HE 81%	Non-HE 19%
*FY97-01 F/FR/AGM			
Navy Afloat	41 of 50	HE 82%	Non-HE 18%
Navy Operational Shore	39 of 50	HE 79%	Non-HE 21%
Navy PMV	295 of 352	HE 84%	Non-HE 16%

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HFACS Model

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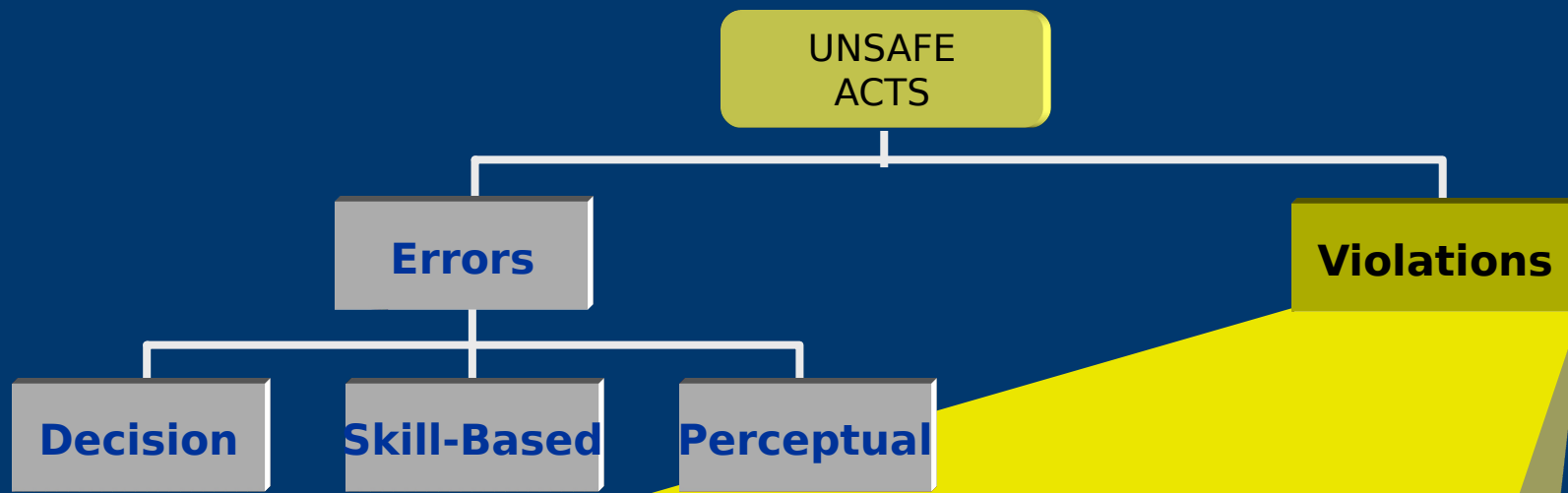5

UNSAFE ACTS

Errors

Violations

Decision   Skill-Based   Perceptual
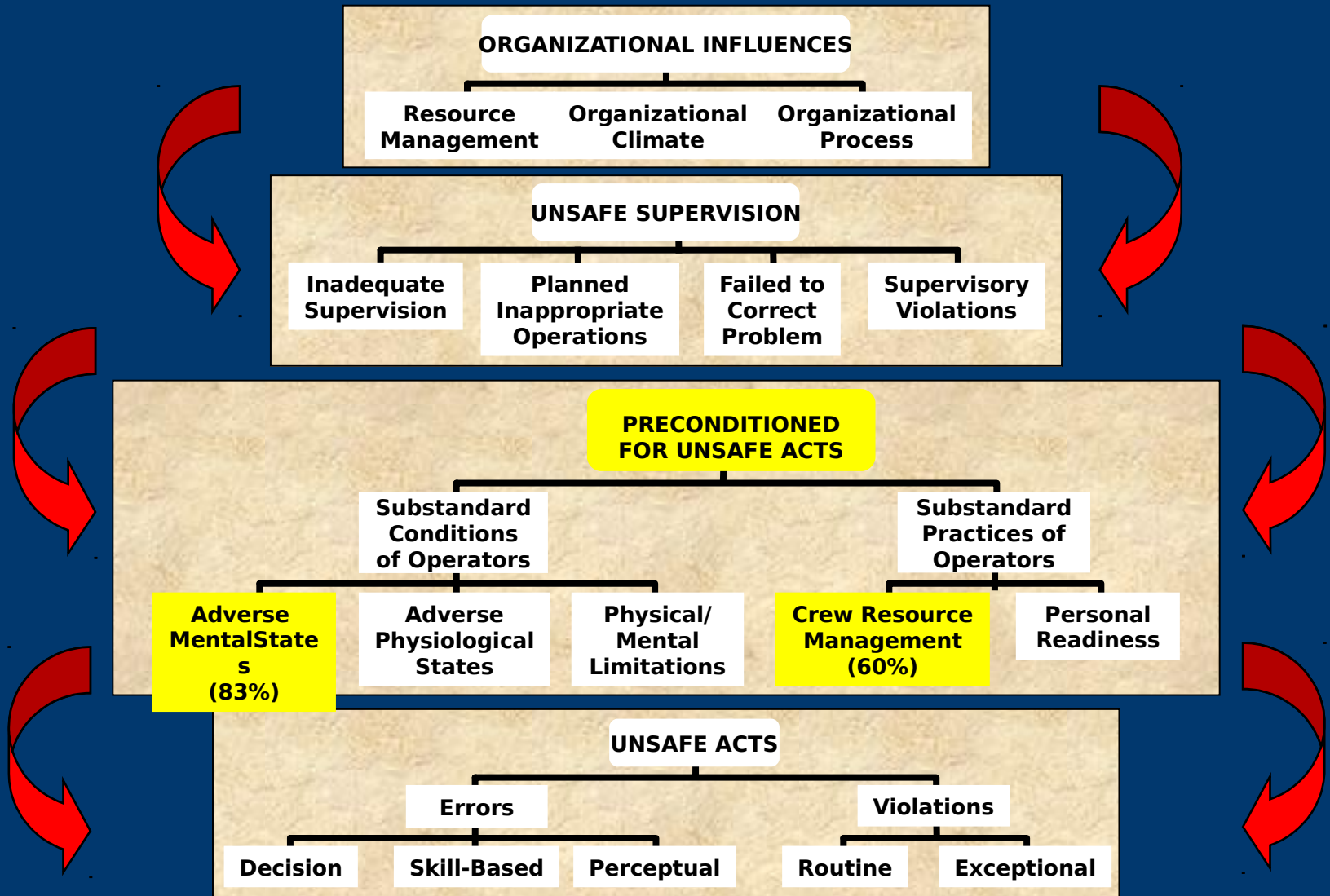
VIOLATIONS

➤ (52) Violation of NATOPS/Regs/SOP

 (7) Failed to adhere to brief

 (5) Not current/qualified for mission

 (5) Improper procedure

 (5) Accepted unnecessary risk

 (2) Briefed unauthorized mission

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Skill-Based Error Breakout

USN/USMC TACAIR & HELO

Class-A Aircrew Error Flight Mishaps

- **(56)** **Breakdown in visual/instrument scan**
- **(11)** **Poor technique**
- **(11)** **Failed to see and avoid**
- **(10)** **Failed to prioritize attention**
- **(9)** **Improper use of flight controls**
- **(8)** **Failed to recognize extremis**
- **(8)** **Inadvertent use of flight controls**
- **(8)** **Omitted checklist item**
- **(8)** **Delayed response**
- **(6)** **Improper instrument cross check**
- **(5)** **Poor habit pattern**

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PRECONDITIONS FOR UNSAFE ACTS

Substandard Conditions of Operators

- **Adverse Mental States**
- **Adverse Physiological States**
- **Physical/Mental Limitations**

Substandard Practices of Operators

- **Crew Resource Management**
- **Personal Readiness**

Preconditions for Unsafe Acts

Unsafe Acts

ADVERSE MENTAL STATE

- ➤ **(57) Channelized attention**
- ➤ **(32) Loss of SA**
- ➤ **(26) Inattention/distraction**
- ➤ **(17) Task saturation**
- ➤ **(19) Overconfidence**
- ➤ **(14) Fatigue**
- ➤ **(8) Complacency**
- ➤ **(5) Lack of confidence**
- ➤ **(5) Stress/perceived stress**

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PRECONDITIONS FOR UNSAFE ACTS

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Substandard Practices of Operators

- Crew Resource Management
- Personal Readiness

Preconditions for Unsafe Acts

Unsafe Acts

CRM

- ➤ (75) Failed to communicate/coordinate
- ➤ (47) Failed to backup
- ➤ (29) Failed to conduct adequate brief
- ➤ (14) Failed to exercise leadership
- ➤ (6) Failed to use all available resources
- ➤ (5) Transcockpit authority gradient
- ➤ (5) Failed to adequately plan/prepare for flight
- ➤ (3) Used non-standard terminology

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Why Are We Seeing An Increase In Skill-Based Errors?

- **Lack of flight time?**
- **Quality of flight time?**
- **Decreasing experience**
- **OpsTempo?**
- **PersTempo?**
- **Shortcoming in our training program?**
- **Shortcoming in our operational practices?**
- **Would increased simulator-flight time be an effective intervention?**

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Intervention Strategies

- **Increase the proficiency of the low time-in-model (< 500 hour) aviators**
  - **use simulator time to augment flight time to achieve earlier proficiency**
- **Emphasize development of psychomotor skills**
  - **use simulator time to augment flight time and the development of a proper scan and stick and rudder skills**
- **Emphasize avoidance of preconditions**
  - **use simulator time to augment flight time and development of automated basic flight skills that enable an aviator to avoid channelized attention/task saturation and improve CRM skills**

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Class-A Flight Mishap Rates

USN/USMC FY97-02

Navy/Marine
FY00: 29 / 1.99
FY01: 18 / 1.22
FY02: 19 / 2.35

Mishap rates per 100,000 flight hours

Marine Corps

Navy

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Aviation

Mishap Investigations

- Human error (aircrew): Leading causal factor
  - Skill-based errors
  - CRM failures
  - Violations
- Inexperience

Surveys

- Manning/inexperience
- Training quality/quantity
- NATOPS/technical pubs
- Cannibalization rates up

TAKEAWAYS

- Fund state-of-art simulators and data centric systems
- Improve training
- Increase proficiency
- Institutionalize ORM
- Enforce standards
- Increase checks and balances

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Class-A Afloat Mishap Rates

USN FY97-02

FY00: 12 / 3.51
FY01:   8 / 2.37
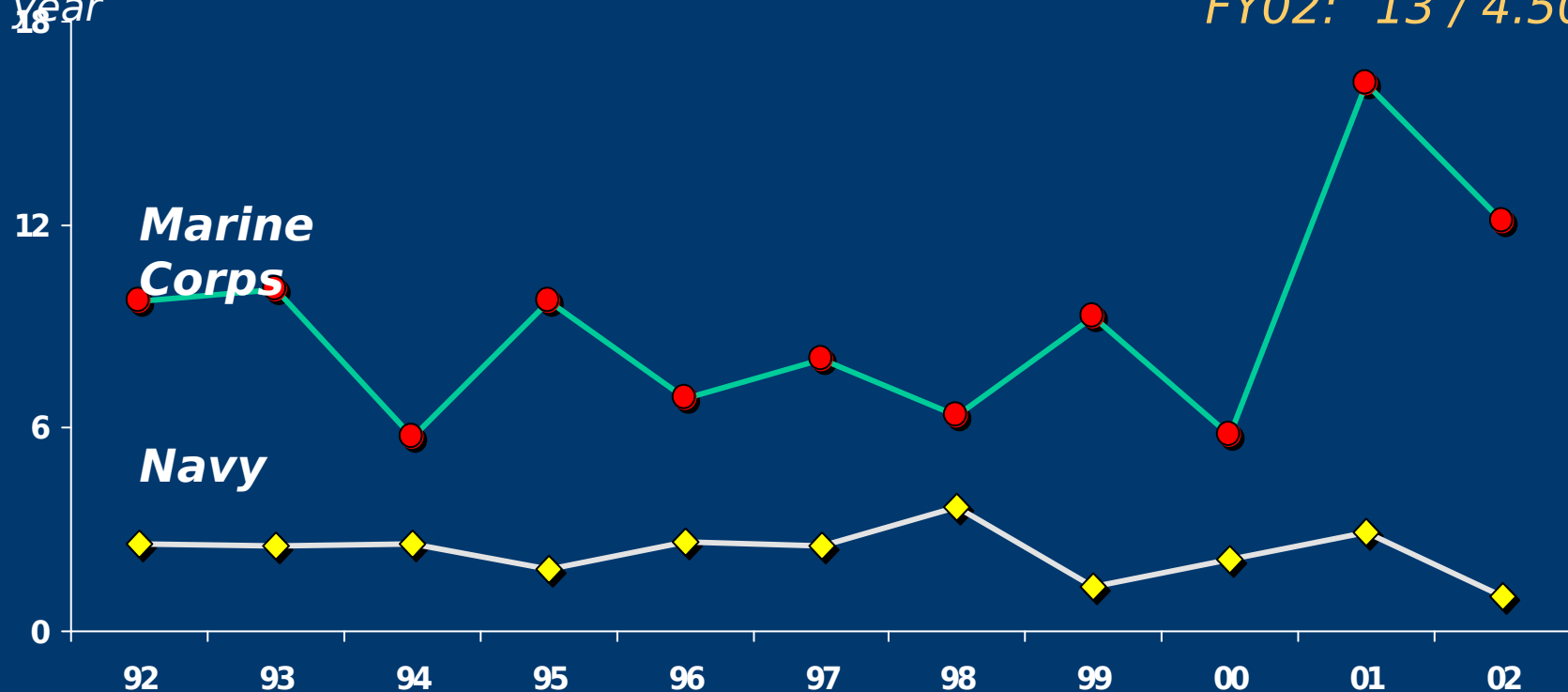FY02:   8 / 4.56

Mishap rates per 100 ships per year

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Afloat

TRENDS

Mishap Investigations

- *Inadequate supervision*
- *Poor PMS*
- *Poor CRM*
- *Poor situational awareness*
- *Complacency*

Surveys

- *Poor leadership, supervision*
- *Poor PMS*
- *Weak self-assessment capability*
- *Ineffective training*

TAKEAWAYS

- *Leadership commitment*
- *Enforce standards*
- *Increase checks and balances*
- *Institutionalize ORM*
- *Demand risk assessments*
- *Improve/standardize navigation technology*
- *Increase simulator training*

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Class-A Op/Shore Mishap Rates

USN/USMC FY97-02

Navy/Marine
FY00: 18 / 3.29
FY01: 39 / 7.08
FY02: 13 / 4.50

Mishap rates per 100,000 personnel per year

18

12

6

0

Marine Corps

Navy

92 93 94 95 96 97 98 99 00 01 02

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Operational Shore

Mishap Investigations

- Lack of headwork
- Inadequate supervision
- Inexperience
- Complacency
- Alcohol involvement
- Non-use of PPE

Surveys

- Ineffective oversight
- Inadequate training
- Lack of ORM
- Poor command culture

TAKEAWAYS

- Continued leadership commitment
- Enforce standards
- Improve awareness
- Demand risk assessments
- Improve safety manning/placement
- Increase checks and balances
- Institutionalize ORM
- Improve training

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PMV Fatality Rates
USN/USMC FY97-02

Navy/Marine
FY00: 114 / 20.86
FY01:   90 / 16.34
FY02:   63 / 21.79

Mishap rates per 100,000 personnel per year

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PMV Fatalities by Community

Total: 351 Sailors

276 Marines

Afloat
135

USMC
Aviation
64

Shore
186

Navy
Aviation
30

USMC
Ground
212

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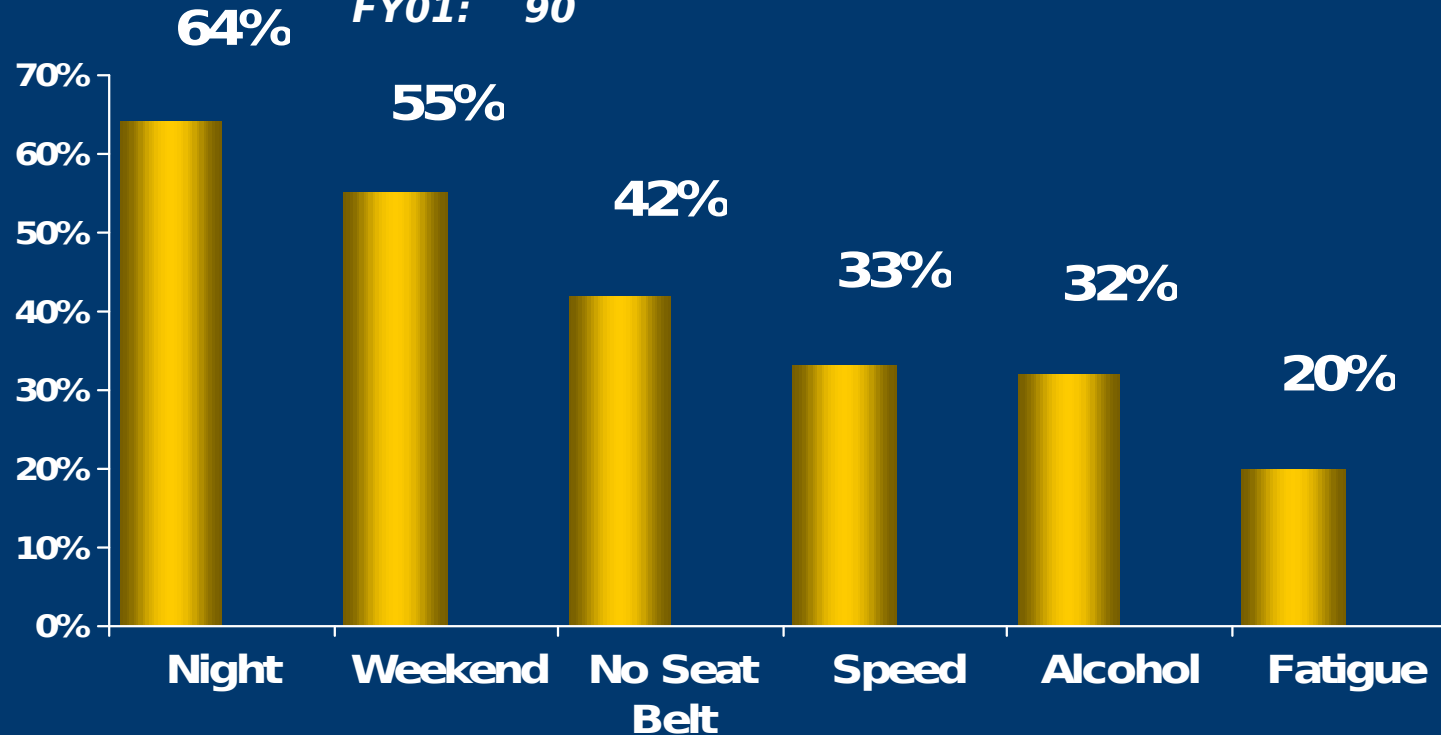
New Navy Traffic Initiatives

Entry Point ORM TrafficProgram

Section I   Navy Rules & Requirements
Section   II   ORM & the Driving Task
Section   III   Traffic's Top Five Causes
Section   IV   Special Driving Situations

Motorcycle Programs

- **Intervention Program**
  Encourages "train before buying"
  Partners with state programs

  New

- **Navy / MSF (RETS*) Partnership**
  * Rider Education Training System
  Experienced Rider Programs

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The Bottom Line

- *Long-term decrease*
- *Short-term plateaus*
- *Full adoption of ORM next success story*

- *In FY97-01, 3 out of 4 Sailors and Marines were killed off duty*
- *85% of all mishaps associated with human error*

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Recommended Solutions

- **Leadership**
- **Culture**
- **Leveraging technology**
- **Resources & acquisition**
- **Mentoring/training**
- **Culture standards**
- **Manning**
- **Checks & balances**

ORM

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Naval Safety Center Services

Mission
Train and motivate Sailors and Marines to prevent mishaps and save lives

Vision
The most combat-ready and safest Navy and Marine Corps.

Responsibility
Collect

Analyze

Disseminate

ON THE ROAD

- **Culture workshops**
- **Unit surveys**
- **ORM unit training**
- **Mishap investigations**
- **USMC MTT seminars**
- **PCO briefings**

AWARENESS

- **26 magazines printed (473,000 copies)**
- **Interactive CD's**
- **Safety Center web page**
- **Acquisition process in-roads**
- **Safety advisories**
- **Customer information requests (3,600+ database queries per month)**

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